Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Implementing Kari's Law and Section 506 of RAY BAUM'S ACT	)	PS Docket No. 18-261
	)	
	)	
Inquiry Concerning 911 Access, Routing, and Location in Enterprise Communications Systems	)	PS Docket No. 17-239
	)	

COMMENTS OF MICROSOFT CORPORATION

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Summary

Consumers and businesses are communicating in ways that were unimaginable when our nation's 911 systems were first developed. As communications capabilities evolve, users' expectations evolve; therefore, the 911 system must evolve too. Where users expect to access emergency services through their communications products and services, a reliable 911 service should be available to the extent technologically feasible. Given the pace of innovation in the location services marketplace, Microsoft believes that these location capabilities can be leveraged relatively quickly and effectively to enhance the 911 capabilities of today's IP-based and cloud-based Multi-line Telephone Systems (MLTS) and interconnected VoIP (iVoIP) services.

The provision of a dispatchable location, as proposed by the FCC in this Notice of Proposed Rulemaking, is most likely achievable if service providers are permitted to rely upon marketplace solutions to the industry's long-standing challenge of locating 911 callers so assistance can be dispatched when and where it is needed. Today, when a device is connected to the internet it often has a plethora of location information available to it – GPS coordinates, a wireless carrier's cell site(s), Wi-Fi hotspots, etc. Leveraging this superset of location information creates an opportunity for the FCC to significantly improve 911 services in the U.S. without imposing complex and expensive regulatory solutions to a problem that can be solved by innovation already in the marketplace.

As a provider of MLTS and iVoIP to businesses and enterprises throughout the U.S. and the world, Microsoft understands first-hand the challenges of locating nomadic users. Our customers rely on our products and services as their primary business "telephone line," whether they are sitting at a desk in their office, working from home for the day, visiting a client across town, awaiting a flight at the airport, or visiting another country for work or for leisure. Microsoft's communications tools are inherently nomadic and typically are used from numerous locales throughout each day, and our customers are demanding that we enable location solutions that will enable us to locate their users when they dial 911 from any of the places they may be – on-campus or beyond – when they need emergency services. The commercial location services already in the marketplace – *i.e.*, the superset of location

information described above – is the best solution to resolving these challenges because it is (i) readily available; (ii) in use around the globe; (iii) far more accurate and reliable than a "registered location" manually entered by the end-user; and (iv) subject to sufficient competitive pressures to ensure its accuracy is closely monitored and continuously improved by the location services provider.

Therefore, where users' expectations are such that emergency calling is available on their communications services, the FCC should create a regulatory framework that enables service providers the flexibility to use solutions readily available in the marketplace. The FCC, however, should not impose an obligation on services for which no such expectation exists – i.e., on one-way calling to the Public Switched Telephone Network ("PSTN"). In Microsoft's experience, users of one-way calling capabilities do not expect to reach emergency services on these tools, and do not use them for emergency calling. In the four countries where Microsoft has voluntarily deployed emergency calling on its one-way outbound calling feature, Skype to Phone (formerly SkypeOut), a mere 1,788 emergency calls have been made in the most recent 23-month period -- evidence that users of one-way outbound-only calling capabilities simply do not commonly use those features to connect to emergency services. Moreover, if a user were to call emergency services from these one-way calling features, there typically is no call-back capability should the 911 call be disconnected. In light of these facts, the FCC should refrain from imposing an emergency calling obligation on one-way outbound calling services. These calling capabilities are not used as a replacement for PSTN calling services, and end users have other options at their disposal more suited to emergency calling.

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Calls to 911 have been saving Americans' lives for 50 years. From its beginnings in the fixed copper-line telephone era and through the wireless communications boom that began in the late 1990s and early 2000s, the 911 system has successfully dispatched emergency assistance to millions of Americans, when and where it was needed. As technology evolves and enables new ways of communicating, it is important that the 911 system continue to evolve as well, to support Americans in need of emergency assistance – whether those Americans are using wireless phones, landline phones, or iPads and desktop computers as their primary "phones," to dial 911. As a provider of communications capabilities to a wide range of businesses equipping their employees with the ability to communicate via their business phone numbers whether at a desk, in a home office, at a client's office, or managing a manufacturing floor, Microsoft has business customers who are demanding (and deserve) improved 911 calling capabilities. Therefore, as described more fully herein, Microsoft is committed to implementing innovative and reliable solutions for emergency calling in response to our customers' needs, and we support the Commission's goals of an improved emergency calling system in the U.S. Microsoft encourages the Commission to address the specific needs and expectations of users of a variety of calling services, which are quite different depending on the type of communications capability; and, Microsoft encourages the use of readily available

solutions that will function seamlessly whether users are in the U.S. or across the world and that can be deployed relatively quickly and seamlessly to improve our nation's emergency calling capabilities sooner rather than later.

I. Background – Microsoft's Communications Products and Services

Microsoft is a U.S.-based corporation that has long provided software and computer operating systems to consumers and businesses across the globe. In recent years, Microsoft has expanded its offerings to provide cloud-based productivity tools that include real-time communications for those users. With respect to many of the issues raised in this Notice of Proposed Rulemaking ("NPRM" or "Notice"), Microsoft provides four relevant products -- three enterprise and business-focused products and services and a single consumer product: (1) the Skype for Business ("SfB") Server, which is an on-premises MLTS-like product; (2) the SfB Online (and, increasingly, a similar service called "Teams") cloud-based MLTS-like service; (3) an interconnected VoIP ("iVoIP") service for large businesses called "Calling Plan"; and (4) a consumer application, Skype, which includes a feature that enables outbound-only calling to telephone numbers. The users of each of these product/service scenarios are directly affected by the issues raised by the FCC. Therefore, before providing Microsoft's comments on the specific issues addressed in this proceeding, we briefly describe each product and service.

SfB Server. More than a decade ago, Microsoft launched an Internet Protocol ("IP")-Private Branch Exchange ("PBX")-like product called SfB Server (previously known as Office Communicator and then, later, Lync), which was similar to a traditional IP-PBX. Purchased by a small, medium, or large/enterprise business, SfB Server is installed, provisioned and operated by the customer, and connected to the customer's telephone/telecom systems and services to enable, among other things, calls to and from the Public Switched Telephone Network ("PSTN") by using either an IP phone on the user's desk or an application running on, *e.g.*, a Personal Computer ("PC"), a Microsoft Surface, a Mac, or a mobile device. In addition to facilitating the making and receiving of telephone calls, the SfB Server enables seamless collaboration and conferencing capabilities so that users across town or across the globe can use our suite of productivity tools in their daily business activities. These tools include VoIP, video, and instant messaging communications among the customer's employees, and a presence indicator (*i.e.,*

whether the person you would like to contact is "busy" or "away" or "free" at that moment), all through the same application running on each employee's computer and/or mobile device. For example, a business may provide the SfB Server application for all of its employees to download for their communications capabilities – whether the employee is on a sales team dispersed across the city, a member of the Finance or HR team working primarily from the office or a home office, a customer service rep making and receiving customer support calls, or an information worker on the floor of a manufacturing facility monitoring the plant's systems and operations.

SfB Online/Teams Phone System Service. In addition to the on-premises server product, Microsoft offers its business and enterprise customers a similar, but cloud-based, solution for its IP-PBX functions and other communications capabilities. By subscribing to our cloud service, customers connect their telephone/telecom systems and services to the MLTS functions in the Microsoft cloud. This online service is not a product or a system or on-premises infrastructure operated by the customer. Rather, it is simply *software* – hosted in Microsoft's cloud and sold to customers through a subscription service. Once connected and provisioned, the customer's employees can use their telephone services to make and receive PSTN calls via an IP phone on the desk or, as noted above with the SfB Server, using a variety of internet-connected devices. Additionally, users of our cloud service have access to the same collaboration and conferencing capabilities, as well as the VoIP, video, messaging and presence functionalities provided by the SfB Server product. Also, as with the SfB Server, the users of Phone System encompass a wide variety of businesses with a diverse number of user scenarios that enable efficient and effective collaboration within and outside of a business' employee base.

Calling Plan. The third Microsoft service that is directly impacted by the FCC's proposals in the NPRM is our interconnected VoIP calling service, Calling Plan. This is a Microsoft service that allows users to make and receive PSTN calls without requiring an additional, stand-alone PSTN line. Packaged with the SfB/Teams Phone System service described immediately above, these business and enterprise customers purchase both their MLTS functionality and their PSTN calling services from Microsoft, which directly assigns the customer its telephone numbers (including porting in and out).

Skype's "Skype to Phone" Functionality. The final Microsoft product relevant to the FCC's dispatchable location NPRM is the traditional consumer application, Skype – specifically, a single feature of that application that is now referred to as "Skype to Phone" (formerly known as, and hereinafter referred to as, "SkypeOut"). Skype is an application that can be downloaded from the internet (or via an app store) for free. Once downloaded, the application enables free communication via VoIP, video or text with other Skype app users. As an added feature, Skype enables users to call phone numbers for a fee. This one-way, outbound-only calling capability has been available to U.S. consumers since the early 2000s. Unlike the three enterprise products and services describe above, the Skype app does not offer a two-way PSTN calling feature. Skype users, in turn, tend not to view or use the app as a replacement for traditional PSTN voice services, including for emergency calling. As described in more detail below, this has been demonstrated by the miniscule number of emergency calls made by Skype users in the four countries where an emergency calling capability is available today.

Microsoft's products and services are inherently nomadic. The common thread among all four of the products and services described above is the fact that they can be used from essentially any place on the planet where the user can access the internet. Microsoft's communications products and services are implemented as software for internet-enabled devices (*e.g.*, a laptop, tablet or mobile phone) that functions over any internet connection available wherever the user travels. Thus, as an employee moves seamlessly through her day – from home to the office to a customer's site, back to the office, and then to the airport or train station – she has ubiquitous access to her business "phone" through an app on her devices. Whether sitting in her office in Redmond, Washington or on a business trip in Brussels, Belgium or vacationing in Mexico, the user of Microsoft's communications capabilities can make a phone call, including a call to 911, from the application downloaded on her device from any internet connection in the world.

Our products and services are designed so users can be constantly nomadic. As a result of this evolving communications marketplace, our business customers, using our communications products and services as their primary business PSTN calling functionality, are demanding that we improve on our current emergency calling solutions. On the other hand,

there is evidence that the consumer users of SkypeOut have no such expectation or demand. Thus, Microsoft is committed to finding solutions that meet customers' expectations and needs, and we look forward to working with the FCC, public safety, industry participants, and other stakeholders to find ways to use today's innovative technologies in the emergency calling system.

II. Discussion

Below Microsoft describes its views on many of the issues raised in the NPRM. First, we address the Commission's proposals regarding MLTS direct dialing and simultaneous notice capabilities, as required by Kari's Law. Next, we discuss the challenges and opportunities created by the Commission's proposals for new dispatchable location requirements on MLTS and iVoIP. And, finally, Microsoft addresses the numerous risks inherent in placing an emergency calling obligation on outbound-only VoIP-to-PSTN calling features.

A. The FCC Should Clarify the Definition of "Pre-Configured"

In the NPRM (as in Kari's Law), an MLTS may not be manufactured or sold in the U.S. "unless such system is pre-configured such that, when properly installed . . . a user may directly initiate a call to 911 from any station equipped with dialing facilities, without dialing any additional digit, code, prefix, or post-fix, including any trunk-access code such as the digit '9', regardless of whether the user is required to dial such a digit, code, prefix, or post-fix for other calls."[1] The FCC proposes that the term "pre-configured" be defined to "mean that the MLTS comes equipped with a default configuration or setting that enables users to dial 911 directly as required under the statute and rules, so long as the system is installed and operated properly."[2] This is further clarified by the FCC as a functionality that is provided "out of the box."[3]

[1] *Implementing Kari's Law and Section 506 of RAY BAUM's Act; Inquiry Concerning 911 Access, Routing, and Location in Enterprise Communications Systems,* PS Docket Nos. 18-261 and 17-239, Notice of Proposed Rulemaking, FCC 18-132 at ¶ 13 (rel. Sep. 26, 2018) ("NPRM" or "Notice"), *citing* Kari's Law, 47 U.S.C. § 623(a).

[2] *Id.* at ¶ 31.

[3] *Id.* at n. 59.

As written, the definition proposed by the FCC appears to assume that all MLTS come in versions that are "plug and play," *i.e.,* that a user need to do nothing more than purchase the product (or subscribe to the service), turn it on, and start making emergency calls by dialing only 911. However, there is no such product or service among Microsoft's MLTS offerings. Every solution, whether it is an on-prem product or our cloud services, must first be installed and provisioned by the customer. It is wholly within the customer's control to determine whether and how the direct 911 dialing works. Therefore, it is not 'pre-configured' for direct dialing to 911 because it is not pre-configured to do anything; rather, it is ready for a customer to configure the system's numerous capabilities, including the direct dialing functionality. In the case of Microsoft's customers, moreover, the company (*i.e.*, customer) may have to configure the system according to the requirements of numerous countries to ensure the system complies not only with U.S. laws and regulations (and U.S. state laws and regulations), but also the laws of, *e.g.,* France, Brazil, Japan, India. For these reasons, Microsoft respectfully requests that the FCC clarify the definition of "pre-configured" so that it accommodates the fact that many (if not most) MLTS capabilities in today's marketplace are not available in a "plug and play" version. "Pre-configured" should be defined in a manner that recognizes the responsibilities of the customer with respect to implementation and provision of the service. Specifically, Microsoft recommends the following definition: "'Pre-configured' means that the MLTS comes equipped with a default configuration or setting that enables users to dial 911 directly as required under the statute and rules, so long as the system is installed and operated properly **or, where no default exists, such as when customer provisioning of the system is required, enables the customer to configure the system to dial 911 directly as required under the statute and rules**."

B. The FCC's Direct Dialing and Simultaneous Notification Requirements are Consistent with Kari's Law and Should Be Reasonably Achievable

Kari's Law requires that covered MLTS ensure that end users can directly dial 911 to reach emergency services rather than having to dial, *e.g.*, 9 + 911. Moreover, under Kari's law, MLTS must enable the customer to establish a simultaneous notification to, *e.g.*, a security office anytime a 911 call is made using the customer's calling service. These direct dialing and simultaneous notice requirements of Kari's Law are features that have long been demanded by Microsoft's MLTS customers. Therefore, as a provider of communications tools to many of the world's largest organizations, Microsoft has already responded by adding these tools into our on-premises server product, and work is underway to include them in our cloud MLTS services. As noted above, however, Microsoft can only provide a product or service that includes the tools for a company/customer to deploy the system or service for direct dialing and simultaneous notification. Proper provisioning and installation by the enterprise customer are a necessary prerequisite to the operation of both features, which both Kari's Law and the FCC appear to acknowledge and understand by placing obligations on MLTS installers and operators as well.[4]

C. MLTS and iVoIP Providers Can Transmit Dispatchable Location if the FCC Embraces Marketplace Solutions that are Readily Available and Capable of Accurately Locating Callers

Over the decades, the FCC has worked consistently with the public safety community and communications providers to improve the ability of Americans to call 911 and have emergency assistance dispatched in a timely manner. For example, beginning in the early 1990s, the FCC jump-started the location of wireless 911 callers through its Phase I and Phase II location requirements.[5] In parallel, as the internet has enabled new and innovative features and services "over the top" of broadband networks (whether wireline or wireless), the technological developments and innovation in location technologies have vastly changed and improved the possibilities for locating 911 callers. Companies have developed new approaches

[4] *See id.* at ¶ 14.

[5] *See* 47 C.F.R. § 20.18.

to calculating an internet user's location – whether to find a restaurant or theater, or to order a ride to that theater. Thus, advances in technology may make it possible to provide superior location capabilities that enable more accurate and reliable location information for emergency calls.

The FCC recognized these technological advances in the Notice of Inquiry it released earlier this year regarding location-based routing of wireless emergency calls.[6] In the Wireless Location NOI, the FCC – following up on a report of the Communications Security Reliability and Interoperability Committee ("CSRIC")[7] – found that over the past several years, there have been new developments in potential location technology options for providers, including a variety of sources such as GPS, other satellite-based information, Wi-Fi hotspots, and what both the FCC and the CSRIC refer to as "Device-Based Hybrid Location."[8] Microsoft believes that these various types of location information can be put to use relatively quickly to significantly increase the chances that MLTS providers and nomadic interconnected VoIP providers – like Microsoft -- can create systems that enable our customers to more readily find help in an emergency. Reliance on a "registered location" alone is not an effective solution for Microsoft's business communications products and services, given that they constantly move as users move from place to place throughout the day and expect to be able to make emergency calls with these business products and services.[9] Moreover, as noted above, Microsoft's customers are demanding improvements in our emergency calling capabilities; therefore, resolving these challenges is a business imperative for us.

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[6] *Location-Based Routing for Wireless 911 Calls*, PS Docket No. 18-64, Notice of Inquiry, 33 FCC Rcd 3238 (2018) ("Wireless Location NOI").

[7] Communications Security, Reliability and Interoperability Council V, Working Group 1, Evolving 911 Services, Final Report -- Task 2: 911 Location-Based Routing (Sep. 2016) ("2016 CSRIC Report").

[8] Wireless Location NOI at ¶¶ 24-25; 2016 CSRIC Report at pp. 16-20.

[9] *See* NPRM at ¶ 75 (FCC asking whether "registered location" is a sufficient proxy for real-time location). The concept of "registered location" was developed in an era when a "nomadic VoIP" service was one that did not move locations with any frequency. *See also id.* at ¶ 73.

Microsoft respectfully requests that the Commission create a regulatory framework that embraces the realities of 21st Century interconnected communications apps and services that are inherently and increasingly nomadic in nature; permits flexibility and innovation to ensure service providers can readily achieve our collective public interest objective of accurately locating callers and connecting them to the most appropriate PSAP; and delivers to the PSAP the most accurate and reliable dispatchable location information available to the service provider. The NPRM queries whether the dispatchable location objective can be achieved by February 2020.[10] Given the numerous technical, operational, financial and other challenges that must be resolved between now and achieving our collective objective, the proposed date likely is too ambitious. However, the more flexibility the Commission permits (including the flexibility to rely on readily available marketplace solutions) – while also reasonably protecting Americans and their confidence in the emergency calling system – the sooner we will see improvements in our emergency calling system in the U.S.

i. Service Providers Subject to an Emergency Calling Obligation Should be Permitted to Use the Best Available Location Information for Providing Dispatchable Location Information

In the NPRM, the FCC posits a definition of "dispatchable location" for text-to-911 that Microsoft believes is the appropriate definition not only for the provision of dispatchable location for a text-to-911, but also for MLTS and iVoIP 911 calls.[11] With respect to text-to-911, the FCC queries whether the appropriate "dispatchable location" is simply "…the best available location that covered text providers could obtain from any available location technology or combination of technologies, including device-based location."[12] This definition is precisely the definition of location that Microsoft proposes for providing dispatchable location to the PSAP – regardless of the type of communications capability being provided. There is no reason to limit this definition to the text-to-911 context. Moreover, there are a number of reasons that this

[10] *Id.*at ¶¶ 87, 88.

[11] *Id.* at ¶ 71.

[12] *Id.*

definition will facilitate a speedier transition to an improved emergency calling system in the U.S.

First, the proposal relies on a superset of location information. The "best available location" measure requires that a covered service provider (*e.g.*, iVoIP, MLTS, wireless carriers) consider all of the location options reasonably available to its service at the time of a call. As explained in the 2016 CSRIC Report and recognized in the FCC's Wireless Location NOI, this often includes a variety of location information sources. Among others, any given communication may include a wireless carrier's cell site; GPS and other satellite-provided information (*e.g.* Galileo); the Wi-Fi hotspot to which the device is connected (if managed by the customer or service provider); Wi-Fi hotspots nearby (if within a confined environment and managed by the customer or service provider); the Wi-Fi hotspots loaded into the wireless industry's NEAD; commercial location information (including, for example, Microsoft's Location Services); and, at least in the case of iVoIP, a manually-entered "registered location" that has been provided by the end user. In other words, there is a ***superset*** of location information that is potentially available to any service running on any device operating on any network at any time, and in the case of nomadic iVoIP and MLTS callers, it is highly likely to more often provide location information that is more accurate than a user's registered location. The entire superset may not be available in every case, but so long as service providers have the flexibility to use the locations available from among this superset of information to calculate the most reliable and accurate location – preferably in a manner that is consistent with open standards, common practice, and global approaches – consumers and businesses will benefit. A regulatory obligation that would limit service providers to only a subset of this location information could slow deployment in the U.S., create friction in the global deployment process, reduce the efficacy of the location capabilities currently available, and likely increase the cost of improving emergency services.

Second, the proposal *builds on marketplace innovation*. The "best available location" measure enables a 911 location solution that builds upon capabilities already in the marketplace, setting the stage for a regulatory framework that supports and embraces innovation. Proscriptive regulatory obligations that limit service providers' options and carve

out approaches inconsistent with industry solutions are likely to be counterproductive in today's marketplace where numerous sources of location information are readily available to devices, apps, and services on the internet. An approach based on "best available location" is largely workable today, and it is increasingly widespread and improving as billions of devices use location information sources every day for a variety of reasons. Moreover, it facilitates reliance on solutions that are proving reliable and accurate, [13] and that are based on commonly used methodologies. "Location" is a term of art that has been defined by the World Wide Web Consortium ("W3C") internet standards body. The definition requires that the location service provide, at a minimum, the user/device's latitude, longitude and a measure of the service's confidence level in that lat/long, *i.e.,* an estimate of the accuracy of the location fix, such as "within 50 meters."

Moreover, the methods and procedures used by location services technologies generally follow the same approach so that the service relies on all available location information, starting with the most reliable/accurate data that is available and backing that up with less reliable information. Specifically, subject to the explicit consent of the user of the device (*i.e.,* whether they have opted to have location services always on, or on only during the use of certain apps on the device), the GPS/satellite location is always the preferred location information, if available. If GPS/satellite information is not available or is not particularly reliable at that time (*i.e.,* the device cannot see a sufficient number of satellites), the service will then attempt to calculate a location by triangulating the user's location among nearby Wi-Fi and/or cell site locations that are available to the location service via its location information database. Because they produce more accurate and reliable locations, the service prioritizes triangulation among Wi-Fi hotspots in the database, but if sufficient Wi-Fi hotspots are not known to the user's current location, the service will triangulate according to known cell sites in

[13] For example, Google's commercial location services (*i.e.,* "the same location seen on Android devices every day, through Google Maps and other location-based apps and services") are in use in the UK for purposes of locating emergency callers. According to Google, "British Telecom in the UK has reported a radius of 50 meters or less for most [calls using Google's location service] (about 85% of locations)…." *See* <https://crisisresponse.google/emergencylocationservice/how-it-works/>.

the area of the user if the device being used contains an active SIM. Finally, if a precise location cannot reliably be calculated, the location service can rely on inferred location, which is location information it may have that is based on the user's profile, *e.g.*, that this particular user/device is generally located at a particular address (*i.e.,* his home or office address) at particular times on particular days of the week.[14] In the context of an iVoIP or MLTS emergency call, the location service's backstop could be the user's 'registered location.'

The databases upon which these location services rely are not populated with manually loaded, static address information. Rather, these databases are created using a variety of techniques, including identifying Wi-Fi hotspots from mobile devices and/or through the purchase of anonymized location data from companies that have collected that data for other business purposes. For example, when a user's mobile device can (i) see a Wi-Fi hotspot(s) and (ii) simultaneously has an accurate GPS fix, the Wi-Fi hotspot information is captured and uploaded into the database, noting its location at/near the location of the GPS fix. Thus, when another user is in the vicinity of that same Wi-Fi hotspot(s) loaded into the database, the location services system now knows that user's location, whether or not a GPS fix is available.

Due largely to competitive pressures to provide the most accurate and reliable location information available,[15] location service providers are constantly reviewing, reassessing and refining the accuracy and reliability of the information that has been loaded into the database. For example, to verify the accuracy of the Wi-Fi hotspot location populated into the database, location services are also designed to test their own accuracy on a continuous basis. At least

[14] For example, if a user has opted into the use of location services at all times, the device will be aware of the user's most recent location just before the user, for example, drives into an underground parking garage and loses GPS coverage. By knowing that the user is connected to a particular cell site (while in the garage) and/or by knowing that the user is in this particular building each Monday-Friday starting at approximately 9:00AM, the location services can provide a more granular inference of the caller's location than simply to area of the cell site or cell sector. Importantly, this type of user profile data is wholly dependent upon the user's privacy settings and consent preferences. User consent to allow use of their location is required.

[15] In the 2016 CSRIC Report, the working group recognized the importance of the competitive pressures to ensure accurate location, finding that "the companies who do control the databases have a long and successful history of compiling, maintaining and utilizing these databases for reliable positioning – and their ongoing commercial success depends on this pattern continuing." 2016 CSRIC Report at p. 18.

one way of verifying the accuracy of the location information collected is to capture the user's GPS coordinates and compare that location to the location the system calculates by triangulating among Wi-Fi hotspots loaded into the database. If the calculated location is consistent with the GPS fix, the location service is confident that the Wi-Fi info in the database is up to date and accurate. If the calculated location is inconsistent with the GPS lat/long, the location services provider is alerted to an issue and will update the database to improve the accuracy of its calculations. Therefore, although proprietary (a concern that was noted in the 2016 CSRIC Report),[16] these databases are managed by companies that are (i) operating within the bounds of global standardized approaches to geolocation (namely, the W3C), (ii) subject to significant competitive pressure to constantly innovate and improve the accuracy and reliability of their location information, and (iii) already in operation around the globe.[17] It is Microsoft's belief that these competitive market pressures are the best way to ensure that all users of emergency calling services benefit from the rapid pace of innovation that defines today's communications marketplace.

Finally, a "best available location" approach avoids the disadvantages of a 911-only location database solution. Reliance on "best available location" does not require the creation of U.S.-only, potentially costly, databases that are needed for no other purpose than regulatory compliance. As Microsoft understands current 911 dispatchable location databases, such as the NEAD, the information loaded into them is a list of static addresses that can only be updated by manual intervention if/when a hotspot address changes. Each static address represents a Wi-Fi hotspot owned/managed/operated by the entity that has loaded the information into the database. This approach may work with a finite number of internet access points within a specified geography, such as at a business' corporate campus or the access points currently loaded in the NEAD, but it ignores the realities that users on the internet will venture to any locale where they can access the internet – whether on a corporate campus

[16] *Id.* at p. 17.

[17] In the 2016 CSRIC Report, the working group identified that "while the possibility exists for large location errors on occasion (outliers), this is true for virtually any location method, and validation checks can detect and preclude the vast majority of these cases…" *Id.* at p. 18.

with its own location database, to a location that happens to have a wireless carrier's Wi-Fi hotspot loaded into the NEAD, or to locations beyond the reach of both.

The concept of a manually-managed database that captures *all* potentially relevant Wi-Fi access points is not a feasible approach in the case of iVoIP and MLTS voice services, like Microsoft's, that are provided "over the top" of any broadband network at any location in the world. First, there are simply too many Wi-Fi hotspots – 90 million in the U.S. and a half-a-billion across the world[18] – that are operated by myriad types of Wi-Fi owners/operators to consider this a feasible option. Second, it is highly unlikely that all hotspot owners/operators would contribute the locations of their access points to a database. As described more fully below, many entities – particularly utilities, banks, and other companies that have significant privacy, national security, and critical infrastructure concerns – are unlikely to contribute information about their infrastructure deployments. Third, even if all hotspots were entered into a database, these hundreds of millions of access points are not static. While they may not move on a daily, weekly, monthly, or even yearly basis, Wi-Fi hotspots are moved from time to time, requiring each Wi-Fi owner/operator to manually update the database each time there is a change. The risk that a hotspot operator moves an access point but does not quickly – and manually – update the database is compounded by the fact that the hotspot owner is highly unlikely to be the service provider subject to the FCC's 911 calling obligations, which means there would be little or no incentive to immediately and accurately update the location database.[19]

However, as explained above, the marketplace has created innovative solutions that eliminate the need for hotspot operators to manually update a database, while also eliminating

[18] In a 2017 white paper, Cisco estimated that there would be a half a billion public hotspots in the world by 2021. 90 million of those hotspots would be located in the U.S. Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2016–2021, at p. 20. In a more recent report, Cisco estimated that, by 2022, there would be 549 million public hotspots in the world, up from 127 million in 2017. Cisco Visual Networking Index: Forecasts and Trends, 2017-2022.

[19] This contrasts with the current NEAD wherein the database is populated primarily (if not wholly) by wireless carriers in their dual role as both the hotspot owner/operator and the service provider subject to 911 obligations, thus ensuring that the entity manually updating the database has an incentive to ensure the information is up-to-date and accurate.

the, e.g., iVoIP service provider's need to know that a hotspot has been moved or deleted. Location services addressed this challenge by creating innovative ways to continuously identify, update, and verify the location of Wi-Fi hotspots so they are effectively and efficiently incorporated into a largely standardized process for calculating users' locations based on GPS/satellite fixes, backed up by reliable databases of hot spot and cell site locations, which are further backed up by user profile information. Therefore, rather than creating regulatory obligations that rely on manual updates to limited subsets of available location information, Microsoft strongly encourages the Commission to encourage and facilitate approaches that leverage the superset of location information already available and in use on a global basis and which is continually being refined and refreshed. Given the extent to which consumers and businesses rely each day on a plethora of services that require accurate location information, the marketplace is operating effectively to ensure that these location services are – and remain – accurate and reliable.

ii. An Improved U.S. Emergency Calling Solution Will Arrive More Quickly and Be More Effective If the FCC Enables the Use of Available Solutions and a Global, Standardized Approach to Location Capabilities and End-to-End Architectures

The FCC should consider the importance of a globally scalable emergency calling solution, both to global communications providers and their internationally nomadic customers. As described throughout these Comments, Microsoft provides services – either through its MLTS on-prem offering, its cloud MLTS service or its own iVoIP service – that allow its users to make calls from an app to a phone number from any place on the planet where the end user can access the internet. Some or all of these services, moreover, are available in nearly every country/geography in the world. This means users are making phone calls from home and work, but they also may be making phone calls from places across the U.S., in an adjoining state, or from a country on the other side of the planet, whether traveling for work or leisure/vacation. This also means that the customer's IT Administrator must install and deploy these services across corporate campuses in numerous geographies, attempting to accommodate unique rules and regulations. The solution that Microsoft advocates here not only provides the most effective solution for users and public safety in the United States, but also supports the global competitiveness of U.S.-based communications providers and the well-

being of their internationally nomadic customers because the emergency calling solutions can more readily scale and be used globally.

Thus, in looking at these issues regarding emergency calling, the complexities of today's communications capabilities are not confined to just the 6,500 PSAPs in the United States. The FCC should be guided by the realities of the global internet and the services it has created – services that will not be most beneficial to users if they are subject to unique approaches for emergency calling services on a country-by-country basis. For example, while the U.S.-designed NEAD may provide useful information for certain types of 911 calls under certain circumstances, it is not an approach that can or should be replicated globally – or even across all covered services in the U.S. The NPRM specifically seeks comment on whether NEAD could potentially assist in improving dispatchable location for iVoIP and MLTS providers.[20] While some providers may want to have the option of using NEAD, it is not a solution for all scenarios. The NEAD was designed for a different purpose and is unlikely to be a good fit for nomadic VoIP because, *inter alia*, such a database will always be a *subset* of the location information available on most 911 calls. Moreover, as discussed above, it is limited due to the sheer number of internet access endpoints that exist in the U.S. (and on the planet); the NEAD cannot reasonably be expected to capture every internet access endpoint to which a potential 911 caller may be connected.

More importantly, no single entity should be required to maintain such a nearly-impossible database because: (i) location technologies, as described above, have become sufficiently sophisticated that they can reliably identify users' locations without a database of static locations maintained by a single entity; and (ii) hundreds of thousands of Wi-Fi endpoints will likely remain out of the reach of any such database due to national security and privacy concerns of entities that would need to contribute to the database to improve its usefulness. Certain types of companies that may have tens, if not hundreds, of thousands of Wi-Fi hotspots across the US and the world simply are not going to provide their proprietary infrastructure information to a third party, particularly if these companies are utilities, banks, or other critical

[20] NPRM at ¶ 65.

infrastructure companies most at risk for cyberattacks. When coupled with the fact that location services vendors have developed ways to reliably replicate that information using a *superset* of the location information available to them, the industry is more likely to benefit from other approaches than solely relying on one particular database.

Rather than mandate reliance of U.S.-only approaches to emergency calling, Microsoft strongly supports an approach that embraces proven marketplace solutions, and global industry protocols, practices, standards and architectures to more quickly and efficiently enable emergency calling around the world. The Commission queried whether international roaming and global standards should be considered as part of this inquiry.[21] As a company operating in a global environment and leveraging the innovation enabled by the global internet, Microsoft wholeheartedly supports a solution that allows providers to use a global, harmonized technical and architectural approach to emergency calling.[22] Relying on international standards and approaches, as well as market-driven solutions that are used globally, will speed the deployment of these critical emergency services capabilities not only in the US, but also across the world.

D. Outbound-Only Calling Features Do Not Create an Expectation of Access to Emergency Services and Should Not Be Subject to the Obligation

As is evident above, Microsoft strongly supports expansion of emergency calling location capabilities where customers expect it, the public interest demands it, and where technology allows it, but emergency calling obligations should be premised on the condition that they would have a reasonable likelihood of improving public safety and enhancing the welfare of users. Extending emergency calling requirements to outbound-only PSTN calling applications would not satisfy those conditions. It would not be in the public interest for the FCC to expand 911 calling regulatory obligations to outbound-only VoIP calling applications

[21] *Id.* at ¶ 88.

[22] There are emerging standards in the emergency calling arena, such as the PEMEA standard adopted by ETSI (the European standards body) last year that defines the way apps calculate a caller's location, match it to the appropriate PSAP, and then route to the PSAP.

because (i) consumers do not expect to use, and are not likely to use, outbound-only applications for emergency calling; (ii) these applications often do not offer callback capabilities, which can create risks and challenges for PSAPs, as well as callers; and (iii) there are existing, more robust options for emergency calling that are more readily available to the end user than outbound-only calling apps. The NPRM also does not offer an adequate legal basis for expanding the scope of this regulatory obligation to a new category of providers.

With respect to consumer expectations, Microsoft's experience enabling emergency calling on SkypeOut in other countries supports the proposition that users do not currently expect outbound-only calling applications to provide emergency calling capabilities. After voluntary and constructive discussions between Skype and telecommunications regulators, Skype voluntarily enabled emergency calling from its app on computers and tablets[23] in four countries: Australia, Denmark, Finland, and the UK. These deployments were possible solely because each of these countries identified a single nationwide PSAP to which emergency calls from Skype computer and tablet apps could be routed, thus enabling Skype to connect callers to an in-country PSAP despite the routing limitations of nomadic internet-based apps attempting to accommodate emergency callings systems created in an era of landline telephone networks. This experience has provided some insight that is useful for determining whether to expand this capability in the U.S., and the data may be instructive to the FCC as it considers this matter.

In the four countries listed above, Skype emergency call volumes are extremely low – a mere total of 1,788 across Australia, the UK, Denmark, and Finland in 2017 and 2018 YTD. The low emergency call volumes are evidence that consumers do not expect to have the capability to make emergency calls through Skype desktop and tablet applications and, when this capability is provided to them, they tend not to use it. Even more telling is the fact that just over 2,000 emergency calls placed from Skype Out lasted less than one minute, strongly

[23] If a Skype user on a mobile device were to make a 911 call from the Skype app, the app has been programmed to enable the emergency call through the native dialer on the mobile phone. Thus, the call is made as if it were made via the CMRS voice service. This approach has the advantage of leveraging the call-back and location capabilities of the mobile phone.

suggesting accidental or nefarious calls to emergency services since valid emergency calls tend to last longer than a minute. That means that more of the emergency calls from SkypeOut were erroneous than were valid. In Denmark, for example, there were five times as many less-than-a-minute calls as there were calls lasting over one minute. Specifically, in Denmark Skype connected 27 emergency calls (over a 23-month period) that may have been legitimate emergencies while connecting 133 calls that lasted less than a minute.[24] Given the very short duration of these calls, it seems likely they might have been hang-ups, calls that were dialed incorrectly or mistakenly, or prank calls. These types of calls create a nuisance to PSAPs, particularly at higher volumes. In sum, the data tells us that, where implemented, the availability of emergency calling on Skype desktop and tablet applications has not been widely used by consumers, but it does seem to increase the number of nuisance calls to emergency call centers.

In addition, outbound-only calling applications are not likely to provide the emergency calling features that users in the United States have come to expect. Outbound-only calling applications, by definition, do not enable the user to receive calls back from the PSAP in the same manner that two-way calling services do. Accordingly, if an emergency call from an outbound-only application were to disconnect, the emergency call operator may have no way to re-establish a connection with the user.[25] Norms derived from decades of emergency calling patterns likely have developed 911 user expectations that the emergency call operator will re-establish a connection with them in the event of a dropped call. Further, particularly during an emergency, many users may not be conscious that an outbound-only application may not enable callback. Thus, if the FCC were to require 911 calling for outbound-only calling applications, it would be developing and promoting user reliance – during critical times of emergency – on an application that lacks central features that 911 callers have come to expect.

[24] Similarly, during this period in Finland, there were more erroneous calls to emergency call centers (those less than one minute in duration) than there were valid emergency calls. In the UK, the number of valid and invalid emergency calls was roughly equal.

[25] In the event that an emergency call is prematurely disconnected, the absence of a callback capability may also generate unnecessary emergency service dispatches.

The FCC should not create consumer expectations where none exist, particularly for applications that, for technical reasons, do not match the features of other readily available options for emergency calling. In 1996, the Commission extended emergency calling requirements to non-service-initialized ("NSI") phones.[26] NSI phones were similar to outbound-only calling apps in that they lacked callback capabilities, although NSI phones were, perhaps, somewhat better suited for emergency calling than outbound-only calling apps because NSI phones could leverage the location capabilities of the mobile wireless networks. In hindsight, that decision was a mistake; requiring emergency calling of NSI phones has proven to burden emergency call centers with accidental and prank calling that interferes with core public safety objectives.[27] As noted above, given emergency call patterns on Skype Out in other countries, there is reason to believe that requiring emergency calling on outbound-only calling applications would not materially benefit the safety of the average user, but could interfere with public safety objectives more broadly by increasing the accidental call burden on emergency call centers.

It also should be relevant to the Commission's analysis that there are other more robust options for emergency calling that are readily available. Fixed and mobile phone penetration in the United States is quite high,[28] rendering it unlikely for an emergency caller to have access to an outbound-only calling app ***and*** an internet connection, but not to a mobile phone or fixed line telephone. Microsoft recognizes that there are edge cases when this might not be the

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[26] *Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems*, CC Docket No. 94-102, Report and Order and Further Notice of Proposed Rulemaking, 11 FCC Rcd 18676, ¶¶ 29-33 (1996).

[27] *See, e.g., 911 Call-Forwarding Requirements for Non-Service-Initialized Phones*, PS Docket 08-51, Notice of Proposed Rulemaking, 30 FCC Rcd 3449 at ¶ 10 (2015) (describing NENA's position that there had developed a "'consensus view' that requiring call forwarding from NSI devices does more harm than good.").

[28] *See, e.g.,* Industry Analysis and Technology Division, Wireline Competition Bureau, FCC, "Voice Telephone Services" Status as of June 30, 2017 at Tbl. 1 (Nov 2018); *see also Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Service*s, WT Docket No. 17-69, Twentieth Report, 32 FCC Rcd 8968 at App. II (2017).

case, but given the drawbacks and limitations described herein, such edge cases are inappropriate bases for expanding the application of emergency calling requirements.

Finally, in addition to the technical and policy concerns, the Commission has not, with sufficient rigor, proposed a statutory basis of authority to impose emergency calling obligations on outbound-only voice applications. The Notice recognizes that the FCC's "current rules do not require outbound-only VoIP services to support 911 or convey dispatchable location with 911 calls"[29] and, as the Commission has done several times in the past, [30] asks whether the FCC should expand the emergency calling regulatory obligation to include outbound-only calling services.[31] To do so would involve an extraordinary expansion of the scope of the FCC's regulatory authority and would exceed the limits of reasonable statutory interpretation. The New and Emerging Technologies 911 Improvement Act provided the FCC with authority to establish emergency calling requirements for IP-enabled voice services which were defined to be synonymous with "interconnected VoIP service."[32] The FCC, however, does not propose to expand or modify the definition of "interconnected VoIP service" to include outbound-only calling apps.[33] Nor does it propose an independent basis for imposing these requirements on applications that currently satisfy the statutory definition of "non-interconnected VoIP."[34]

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[29] NPRM at ¶ 83.

[30] *IP-Enabled Services; E911 Requirements for IP-Enabled Service Providers*, WC Docket Nos. 04-36 and 05-196, First Report and Order and Notice of Proposed Rulemaking, 20 FCC Rcd 10245 at ¶ 58 (2005) ("[S]hould E911 obligations apply to VoIP services that enable users to terminate calls to the PSTN but do not permit users to receive calls that originate on the PSTN?"); *see also Amending the Definition of Interconnected VoIP Service in Section 9.3 of the Commission's Rules; Wireless E911 Location Accuracy Requirements; E911 Requirements for IP-Enabled Service Providers*, GN Docket No. 11-117; PS Docket No. 07-114; WC Docket No. 05-196, Notice of Proposed Rulemaking, Third Report and Order and Second Further Notice of Proposed Rulemaking, 26 FCC Rcd 10074 at ¶ 48 (2011).

[31] NPRM at ¶ 84.

[32] 47 U.S.C. § 615b(8) ("IP-enabled service has the meaning given the term 'interconnected VoIP service' by § 9.3 of the Federal Communications Commission's regulations.").

[33] *See NPRM* at n. 135 ("While we propose to adopt the new term '911 VoIP Services' for use in our 911 rules, we intend to retain our existing definition of interconnected VoIP service since that definition is referenced by various non-911 statutory provisions and rules.").

[34] 47 U.S.C. § 153(36) ("The term non-interconnected VoIP service means a service that enables real-time voice communications that originate from or terminate to the user's location using Internet

Therefore, the Notice does not supply adequate notice or explanation of the proposed statutory basis for expanding the scope of emergency calling regulations to include an entirely new category of providers and applications.

In sum, although Microsoft strongly supports the evolution of emergency calling solutions in appropriate circumstances, it cautions against doing so reflexively, particularly where, as with outbound-only calling applications, the imposition of such a requirement is unlikely to produce significant improvements in consumer welfare and public safety effectiveness.

III. Conclusion

Rapid innovation in devices, software, and infrastructure has continued to generate new and better ways for people to communicate. Today, businesses can efficiently and effectively enable employees to remain seamlessly in contact via a single "phone" connection throughout the day across devices, locations, and types of connections – from a business campus to a remote field location to a coffee shop to another country. This diversity of potential use cases would have seemed fanciful during the founding era of the emergency calling system in the United States, and despite ongoing regulatory and public safety system modernization efforts the pace of marketplace innovation continues to race ahead.

Innovation in communication has delivered many societal benefits, including vital improvements for emergency calling services, but it has also resulted in complexity that can be challenging for traditional regulatory frameworks to address. Microsoft commends the FCC for tackling these challenges in this proceeding, and we are committed to bringing the best available solutions for emergency calling to our users. Indeed, we see many exciting opportunities to improve over today's emergency calling status quo -- with different improvements for different use cases – but with forward progress. We encourage the FCC to adopt with rules that reinforce the critical role of emergency calling services, that preserve the

protocol or any successor protocol; and requires Internet protocol compatible customer premises equipment; and does not include any service that is an interconnected VoIP service.").

ability of providers to solve different use case problems differently, and that guard against unintended negative consequences that could limit the benefits to end users of ongoing innovation in the communications market.

Respectfully submitted,

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